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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of

David Nagi — Art Unit: 1732

Serial No. 10/710,259 — Examiner: Monica Anne Huson

Filed: June 29, 2004

For: THIN WALL INJECTION WITH IN-MOLD DISPLACEMENT

Attorney Docket No: LC 0155 PUS (36792-25)

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BRIEF ON APPEAL

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

This brief is submitted in support of the Notice of Appeal of the Final Rejection filed July 8, 2008.

I. Real Party in Interest

The real party in interest in this matter is Lear Corporation organized under the laws of the State of Delaware and having its principal place of business in Southfield, Michigan (hereinafter "Lear").

II. Related Appeals and Interferences

There are no other known appeals or interferences that will directly affect or be directly affected by or have bearing on the Board's decision in the pending appeal.

III. Status of the Claims

Claims 1, 3 and 6-11 stand rejected under 35 USC §103(a) as being unpatentable over Sasaki et al. (USP 5,500,166) in view of Kreuttner (USP 4,447,372) and further in view of Hirol et al. (USP 7,303,719). This was the rejection in the final Office Action dated April 8, 2008.

Claims 2, 4-5 and 12-20 have been cancelled from the application.

A copy of the claims on appeal is attached as an Appendix.

IV. Status of Amendments

There are no post-final rejection amendments to consider.

V. Summary of Claimed Subject Matter

The present invention relates to an improved method for the manufacture of plastic injection molded products, particularly those which have thin walls, or incorporate thin wall sections. The manufacture of plastic products and components constitute a major part of numerous consumer products in common use, including houseware products and components for vehicles. However, the large size of many components, as well as complex exterior configurations, often cause difficulties in the injection molding process. Common problems include warpage, shrinkage, non-uniform color, sink marks, and knit line issues.

In efforts to reduce material costs and increase production, particularly relative to plastic products which are made in large quantities, efforts have been made to reduce the wall thickness wherever possible. Thinner walls result in the use of less plastic material which can result in significant savings. Material costs are often the largest part of the cost of plastic injection molded parts and components. Also, the thinner the plastic parts, the faster the cooling time for the molded product in the mold and thus the faster the cycle time. This results in increased production over a given time period, also resulting in decreased manufacture costs.

Prior efforts to reduce the thickness of walls and other portions of plastic injection molded components were often not satisfactory. One or more of the common problems mentioned above often resulted from these attempts.

The present invention overcomes the problems commonly experienced with present systems and processes which attempt to manufacture plastic injection

molded parts with thin wall sections. In accordance with preferred embodiments of the invention, a mold is provided with a cavity in the size and shape of the final product, such as door panel for a vehicle. One or more moveable plungers or piston members are provided in one or both of the mold halves and operate to narrow the plastic part at substantial portions in its surface area. The molded product has a thinner wall portion over 50% or more of its total surface area, and preferably 70-75%.

Where two or more piston members are provided, they are positioned to form thin areas in separate or contiguous areas. In addition, opposed piston members in both halves of the mold could be provided.

Claim 1 is the only independent claim in the case. Claims 3 and 6-11 are all dependent from claim 1. Claim 1 covers a method for injection molding a plastic product in a mold cavity, the product having a thin cross-section in non-structural support areas and having thicker areas where structural support is needed. The thinner portions comprise at least 50% of the surface area of the part.

The exemplary process and product described in the specification is a door panel 10 [0021]. The door panel has a thinner wall section or sections 12, while the remainder 14 has a thicker wall section. The thicker areas are positioned in order to support the mounting of arm rests, door latches, window latches, and the like [0021]. The thinner wall sections cover at least 50% or more of the total surface area of the molded part [0022]. In door panels manufactured today, the thicker wall sections have a thickness of about 3 mm, while the thinner sections have a thickness of about 2.5 mm or less [0023] – [0024].

Since many of the plastic injection molded parts are visible in a vehicle, such as door panels 10, it is important that the molded products be free from color distortions, knit lines, sink marks and the like [0024]. The present invention process meets these demanding requirements.

In accordance with claim 1, a mold cavity 28 is provided between two mold members [0026]. A quantity of plastic material less than the full amount to fill the cavity (i.e. a “short shot”) is injected in the cavity [0027]. One ore more piston members 30 are provided in the mold and initially in their retracted positions [0027].

Once the quantity of plastic material is injected into the mold cavity, the piston member(s) is moved into the cavity. This forces the plastic material to fill the entire

remaining space in the cavity [0029]-[0030] and the formation of knit lines is minimized. The piston member 30 covers 50% or more of the surface area of the molded product [0077].

Also, in accordance with claim 1, the cross-section is not reduced where structural support is needed for subsequent mounting of an accessory member, such as a door handle or the like [0021]-[0022].

Once the plastic member is cooled in the mold cavity, the molded part is ejected [0036].

The method as set forth in claim 1 is shown in box form in Figure 6 of the drawings, and is specifically described in Paragraphs [0034]-[0036] of the specification.

Dependent claims 3 and 6-11 add further features or processing steps to the inventive method as set forth in claim 1. For example, claim 3 requires that the cross-section be reduced at least 75% of the surface area [0022].

Claim 6 requires the presence and use of at least two piston members in the mold cavity [0037]. This would allow thinner wall sections at separated areas.

Claim 7 is dependent from claim 6 and specifies that the two piston members are positioned on the same side of the mold cavity [0037]. Claim 8 is also dependent from claim 6 and specifies that the two piston members are positioned opposed to one another in the mold cavity [0037].

Claim 9 adds the further processing step to claim 1 that the mold is opened and the ejected molded parts are removed from the mold cavity [0036].

Claims 10 and 11 are also dependent from claim 1 and add the feature that the thickness of the walls in the thinner sections are about 3 mm in thickness and 2.5 mm in thickness, respectively [0023]-[0024].

VI. Grounds of Rejection To Be Reviewed on Appeal

Claims 1, 3 and 6-11 stand rejected under 35 USC §103(a) as being unpatentable over Sasaki et al. (USP 5,500,166) in view of Kreuttner (USP 4,447,372) and further in view of Hirol et al. (USP 7,303,710).

The issue on this appeal is thus whether claims 1, 3 and 6-11 are unobvious and patentable under 35 USC §103(a) over a combination of the Sasaki et al. Kreuttner, and Hirol et al. references.

VII. Argument

It is the Appellant's position that the Examiner has failed to establish a proper *prima facia* rejection of the appealed claims.

Claim 1

Claim 1 recites a method for injection molding a plastic part for a vehicle, the part having thick sections where support is needed for accessory mounting, and thinner sections over 50% or more of the cross-sectional area to save material and expense.

The invention of claim 1 has particular use in molding door panels and other plastic component parts for automobiles and other vehicles. With production vehicles where it is important to reduce weight and cost, the present invention is extremely useful and beneficial. For the molding of door panels, for example, the thickness of more than 50% of the surface area can be reduced. It is significant, however, to retain the original part thickness in one or more areas in order to support the mounting of accessory items, such as door handles, arm rests, etc.

It is also important to reduce knit lines in the plastic molded parts because knit lines can be points of weakness and often the causes of failure of the parts. By squeezing the short shot of plastic material with one or more piston members, the plastic material is forced into all areas of the mold cavity without the formation of knit lines.

The three references cited by the Examiner, namely Sasaki et al., Kreuttner and Hirol et al. do not disclose or suggest all of the processing steps as set forth in claim 1. The references also do not recognize the significant beneficial results achieved by the claimed invention.

Sasaki et al. simply discloses a relatively conventional plastic injection molding system and process. The two halves of the mold are positioned horizontally and are moveable relative to one another in order to compress the plastic material. Kreuttner discloses a plastic injection molding system process for making eyeglass lenses, with one of the surfaces of the molding cavity being elastically deformable and deformable by a piston member. Neither of the primary references provide even a *prima facia* showing of the basic method as set forth in claim 1. Neither disclose or suggest a moveable piston member in a mold cavity for creating thinner sections or

portions in a plastic molded product in order to utilize less material and save molding time and expense.

The newly cited Hirol et al. reference is specifically related only to the molding of a circular or toothed gear member. A pressing core is used to provide an annular web outside a central boss and inside a circular rim. It is only with hindsight based on the Applicant's teaching that this reference could possibly be combined with the other two references. All three references relate to completely different processes and systems for different products and using different molds and molding techniques. It is pure speculation to combine them in the manner utilized by the Examiner.

It is incumbent on the Examiner to give full and proper consideration and credit to all of the limitations and features of the claims. Even if combined for all that these references teach, they would not render claim 1 obvious to persons of ordinary skill in the art.

Accordingly, it is respectfully submitted that the rejection of claim 1 is improper for failure of the Examiner to establish a *prima facia* case of obviousness, and it is respectfully requested that the Board reverse the final rejection and allow claim 1.

Claim 3

Claim 3 is dependent from claim 1 and adds the feature that the reduced thinner cross-section comprises at least 75% of the surface area of the molded part. The rejection of claim 3 is improper for at least the same reasons as given above in support of claim 1.

Claim 6

Claim 6 is dependent from claim 1 and calls for at least two piston members be utilized to reduce the cross-section of the mold cavity to produce the thinner wall sections in the final molded product. This feature is not disclosed or suggested in any of the three cited references and thus the rejection of claim 6 should be reversed for this reason. Also, the rejection of claim 6 is improper for the same reasons as given above in support of claim 1.

Claim 7

Claim 7 is dependent from claim 6 which in turn is dependent from claim 1 Claim 7 calls for the two piston members to be positioned on the same side of the mold cavity. The rejection of claim 7 thus is improper for the same reasons as given above in support of the patentability of claims 1 and 6.

Claim 8

Claim 8 is also dependent from claim 6 which, as mentioned above, is dependent from claim 1. Claim 8 calls for the two piston members to be positioned opposite to one another in the mold cavity. This is another step removed from any combination of the Examiner's three cited references. Thus, the rejection of claim 8 is improper for this reason as well the same reasons as given above in support of the patentability of claims 1 and 6.

Claim 9

Claim 9 is dependent from claim 1 and adds the further processing step that the mold is opened and the rejected parts are removed from the mold cavity. The rejection of claim 9 is improper for at least the same reasons as given above in support of claim 1.

Claim 10

Claim 10 is dependent from claim 1 and calls for the reduced cross-sectional areas in the mold cavity, and thus in the resultant molded part, to have a wall thickness of less than about 3 mm. This is also a feature completely absent from any of the three cited references and adds something which it is believed that only the present invention can accomplish. Prior to the present invention, it was not possible to provide a molded plastic door panel for a vehicle which had over 50% of its surface area at 3 mm or less in thickness. For this reason, as well as for the same reasons stated above in support of claim 1, it is respectfully submitted that the rejection of claim 10 should be reversed.

Claim 11

Claim 11 is dependent from claim 10 which in turn is dependent from claim 1. Claim 11 calls for the reduced cross-sectional areas to have a thickness of about 2.5 mm. The rejection of claim 11 thus is improper for the same reasons as given above in support of the patentability of claims 1 and 10.

Summary

For all of the above reasons, the rejections of claims 1, 3 and 6-11 are improper and the final rejection of each one should be reversed. In this regard, the Applicant requests that each of claims 1, 3 and 6-11 be viewed separately as a separate and distinct invention. (In particular, claims 3 and 6-11 do not stand or fall with claim 1 but are patentable in their own right.)

VIII. Claims Appendix

A copy of each of the claims involved in this appeal, namely claims 1, 3 and 6-11, are included in Appendix A.

IX. Evidence Appendix

None.

X. Related Proceedings Appendix

None.

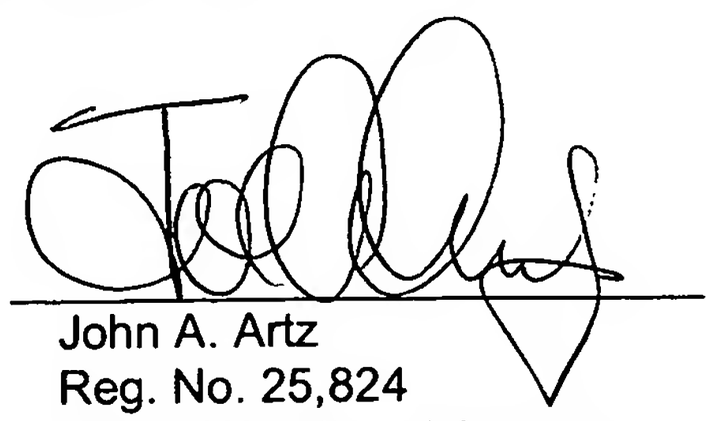
XI. Cited References Appendix

None

XII. Conclusion

For the foregoing reasons, the Applicant respectfully requests that the Board direct the Examiner in charge of this examination to withdraw the rejections and pass claims 1, 3 and 6-11 to issuance.

DICKINSON WRIGHT PLLC

By: 

John A. Artz
Reg. No. 25,824
38525 Woodward Avenue
Suite 2000
Bloomfield Hills, MI 48304-5092
(248) 433-7200

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APPENDIX A

1. A method for plastic injection molding a component plastic molded part for a vehicle comprising:

providing a mold cavity to form a plastic molded part with a predetermined surface area;

injecting a quantity of plastic material into said mold cavity, the quantity of said plastic material being less than the full amount to fill the cavity;

moving a piston member in said cavity in order to reduce the cross section of the mold cavity at least at 50% of the surface area and to force said quantity of plastic material to fill the remaining space in the mold cavity;

said cross-section not being reduced in at least one area where structural support is needed for subsequent mounting of an accessory member;

allowing the plastic material to cool in the mold cavity; and

ejecting the molded part from the mold cavity,

wherein the molded part has thin walled sections at least at 50% of its surface area and the formation of knit lines is minimized.

3. The method as described in claim 1 wherein said cross-section is reduced at least 75% of the surface area.

6. The method as described in claim 1 wherein said cross-section of the mold cavity is reduced by movement of at least two piston members in the mold cavity.

7. The method as described in claim 6 wherein said at least two piston members are positioned in the same side of the mold cavity.

8. The method as described in claim 6 wherein at least two of said piston members are positioned opposed to one another in said mold cavity.

9. The method as described in claim 1 further comprising the step of ejecting the molded part comprises opening the mold and removing the molded part.

10. The method as described in claim 1 in which the cross-section of the mold cavity is reduced to provide a molded plastic part with a wall thickness of less than about 3 mm in the reduced cross-section areas.

11. The method as described in claim 10 wherein the wall thickness is reduced to about 2.5 mm.